



# LAGNIAPPE

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September 2007

## J-2X powerpack to begin testing

The NASA-contractor J-2X engine team at NASA Stennis Space Center is moving forward with preparations to begin engine powerpack testing later this year on the center's A-1 Test Stand.

Following a facility readiness review Sept. 11, J-2X program managers approved SSC's recent preparations for testing the J-2X powerpack. The agreement means the powerpack was cleared for installation in the A-1 Test Stand, and a series of "chill-down" tests are to begin in November.

A-1 has been undergoing modifications to prepare for the J-2X powerpack testing since last fall, when it was officially transferred from the Space Shuttle Program to NASA's Constellation Program. NASA's developing J-2X engine will propel the Earth departure stages of the Constellation Program's Ares I crew launch vehicle and Ares V cargo launch vehicle that will take America back to the moon with eventual journeys to Mars.

"The chill-down tests are to verify that, when the liquid oxygen and liquid hydrogen run through the pump, the facility and the instrumentation perform as expected," said Brian Sproles, Pratt & Whitney Rocketdyne J-2X assembly and test manager at SSC.

The chill-down tests follow "cold shock" tests conducted in August that checked out the test stand's support systems, making sure they were robust enough to withstand test conditions, and would perform normally when the test article arrives. The term "cold shock" refers to the sudden drop in temperature when the supercold liquid hydrogen and liquid oxygen hit the pipes – from the ambient 90+ degrees F to -325 degrees F.



Virgil Smith (left) and Paul Miller work to assemble the J-2X powerpack test article in Pratt & Whitney Rocketdyne's engine processing facility in Stennis Space Center's Building 9101. The PWR employees are preparing the powerpack for a series of 'chill-down' tests set to begin in November on the A-1 Test Stand.

"The point is to check out the facility before we put the hardware in it," said NASA's Gary Benton, J-2X project manager at SSC. "There's only one test article now, so it's critical to check out the facility before we install this unique hardware."

Included among the latest modifications to A-1 Test Stand was cutting the deck hole needed to fit the powerpack. The notch on A-1's Level 5 (engine deck) is a rough circle about 5 feet in diameter, considerably smaller than that needed for accessing the space shuttle main engine when it was installed on the stand. Technicians and welders had to cut through the open aluminum grating floor on Level 5, and then fabricate the floor's structural steel support members. This configuration will remain in place at least until this powerpack test series is complete, according to Mike Nichols, NASA's A-1 and A-2 facility manager.

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From the desk of  
**Dr. Richard Gilbrech**  
 Director,  
 Stennis Space Center



Realizing this will be my last Lagniappe column, I wanted to relay to everyone that it has been my distinct pleasure to serve as center director at Stennis Space Center for nearly two years. I'm proud to have been a part of your many accomplishments during this time.

Shortly after coming on board at SSC, we had the groundbreaking of the NASA Shared Services Center. Construction on that building is moving along and the building is targeted for opening in the spring of next year.

The new Emergency Operations Center being built at the corner of Trent Lott Parkway and Saturn Drive is another important project and will centrally locate the fire department, medical clinic, emergency management and security services.

We also marked a few anniversaries during my tenure as SSC director. We had the 40th anniversary of the first engine test at SSC, and the 25th anniversary of the space shuttle's first flight on STS-1.

We also just recognized the second anniversary of Hurricane Katrina, which caused so much damage to homes, businesses and infrastructure along the Gulf Coast. We have focused on repairing the damage, improving emergency processes and incorporating lessons learned into our hurricane preparations.

Today, all rocket engine testing in support of certification and flight readiness of space shuttle main engines and the development of advanced rocket engine technology supporting NASA's exploration mission is being accomplished successfully – a testament to the resilient spirit of our workforce.

I had the privilege of supporting five space shuttle launches in the firing room at Kennedy Space Center as Stennis director, and we're all fortunate to have the crews now visit after each launch to share their amazing accomplishments with the Stennis team.

With the space shuttle set to retire in 2010, SSC will play a key role in propelling its successors, Ares I and Ares V, into orbit.

In November last year, the A-1 Test Stand was handed over from SSME testing to the Constellation Program. Modifications to the stand are on schedule for the upcoming installation of the J-2X powerpack.

And, last month we held the groundbreaking for the A-3 Test Stand, which will provide altitude testing for the Constellation Program's J-2X engine.

I'm now handing over the helm of SSC to Bob Cabana, who is an excellent choice to lead Stennis into the future. I have every confidence SSC will continue to do great things under his leadership.

As I move to NASA Headquarters as Associate Administrator for Exploration Systems Mission Directorate, I'm certain SSC will continue to excel in rocket propulsion testing and Earth Science. Your outstanding efforts have not gone unnoticed throughout the agency, and I look for this reputation to continue to grow.

Stennis has populated the agency with leaders and I don't consider you as losing a center director, but that you're gaining another Stennis advocate at Headquarters.

Saying I'm proud of the exceptional workforce at Stennis is an understatement. You have met many challenges head on, and continue to rise above them.

Two other projects I hope will come to fruition are the INFINITY science, technology and education center and the potential four-lane expansion of Highway 607 to the north.

I know I leave these and the other ongoing work here in capable hands. I will not forget what I consider to be my NASA home, and hope you invite me to visit often.

As I like to say, this is not farewell, but adieu until we meet again.

*Richard J. Gilbrech*

## FULFILLING NASA'S EXPLORATION MISSION

# Water tests to gather data on J-2X duct

NASA's return to a proven design for its future spacecraft will once again call on Stennis Space Center's expertise in rocket engine testing. This time, the subject will be a component known as a scissors duct for the developing J-2X engine.

The duct is a piece of flexible piping with convoluted sides. It connects the fuel and oxidizer turbo pumps on the engine to the launch vehicle's upper stage run lines. A scissors mechanism outside the duct allows it to expand and contract horizontally (like an accordion) with the extreme temperatures of the super-cold propellants that flow through it.

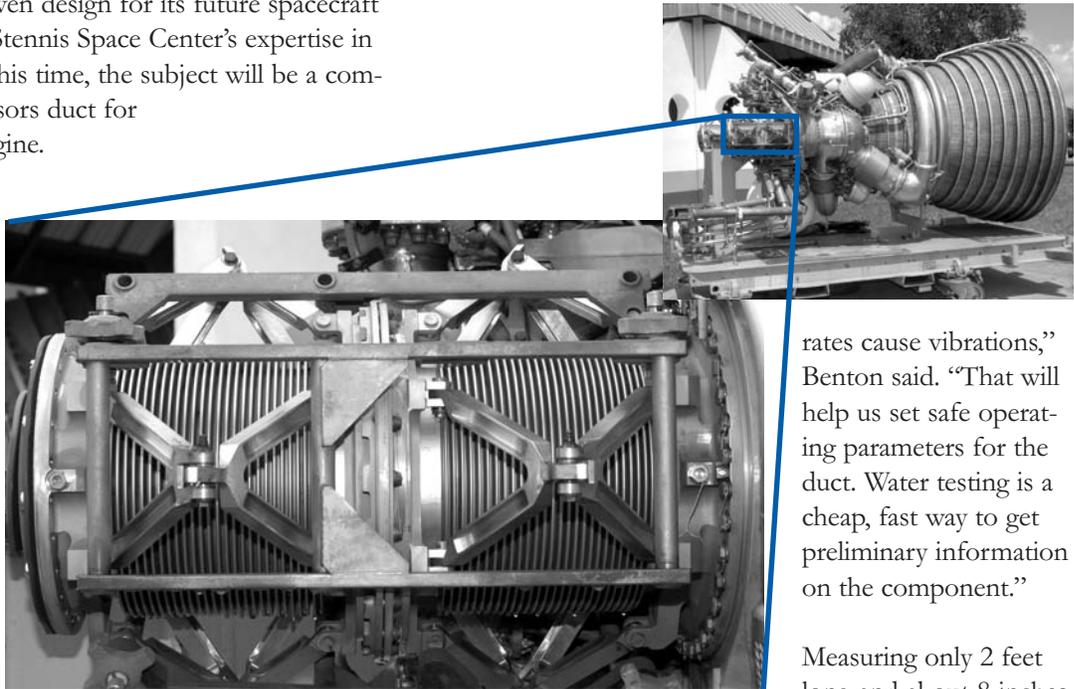
According to Gary Benton, NASA-SSC's

J-2X project manager, NASA needs to validate the design of the scissors duct because the engine's high-pressure propellant fuels could cause vibrations under certain conditions.

The J-2X is based on technology developed and proven in the Apollo era. Its predecessor, the J-2, powered the Saturn V rocket that first carried Americans to the moon. The 1960s engine and the 21st century engine are very similar. The newer engine will power the upper stage of NASA's new crew launch vehicle, Ares I, and the Earth departure stage of the new cargo launch vehicle, Ares V – vehicles that will help the nation fulfill its vision for space exploration. SSC tested the J-2, and will test the J-2X.

Using a relatively low-tech method, SSC engineers will attempt to validate the scissors duct modeling. They will gauge its tolerances by pushing water through it at varying velocities and measuring the effects.

"We're going to flow water through it at different rates to look for potential vibrations and determine what flow



Stennis Space Center engineers are preparing to conduct water tests on an updated version of the scissors duct component of the J-2X engine. Measuring about 2 feet long and about 8 inches in diameter, the duct (above) on the J-2X predecessor, the J-2, connected its fuel turbo pumps to the flight vehicle's upper stage run tanks. According to NASA's J-2X project manager at SSC, Gary Benton, the water tests should establish the limits of the duct's ability to withstand vibration.

rates cause vibrations," Benton said. "That will help us set safe operating parameters for the duct. Water testing is a cheap, fast way to get preliminary information on the component."

Measuring only 2 feet long and about 8 inches in diameter, the duct is lighter and more compact than the optional solid piping that could be used for the same purpose. The solid piping's

only advantage over its flexible counterpart is durability.

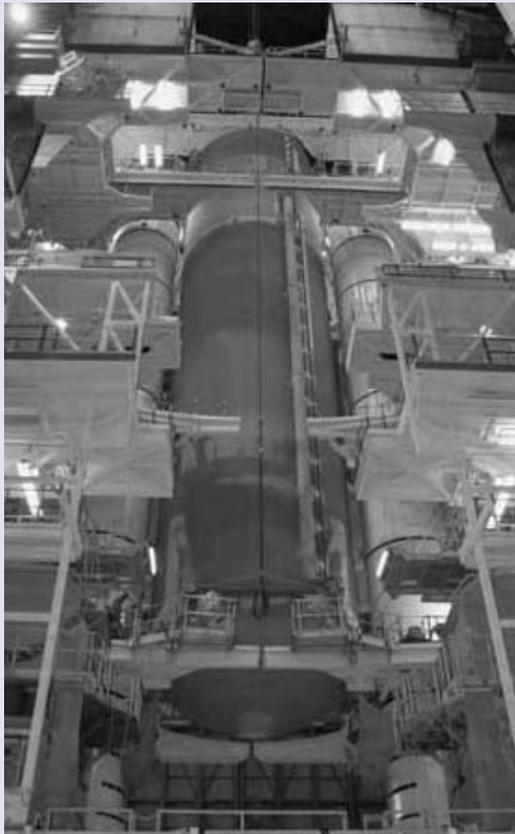
Engineers at Marshall Space Flight Center in Huntsville, Ala., are working on an upgrade to the heritage duct's design, Benton said. While SSC waits for the final design specifications, Benton is overseeing preparations to conduct the water testing on SSC's E-1 Test Stand.

"We scheduled facility testing in mid-September," Benton said. "We hope to receive the article soon, and conduct testing in late September or early October.

"Since the flow tests will use water, they won't require propellant run tanks or valves at E-1. We'll run the water through it and collect the data utilizing the data recording system at E-1."

Though low-tech and seemingly simple, the water flow tests at SSC will provide crucial data, allowing the development of the J-2X engine to proceed safely, efficiently and on schedule.

## STS-120 External Tank prepared for launch



In the Vehicle Assembly Building at NASA's Kennedy Space Center in Florida, the external tank is lowered between the twin solid rocket boosters on the mobile launcher platform. Inside the VAB, technicians attached the external tank to the twin solid rocket boosters in preparation for the launch of mission STS-120, targeted for Oct. 23. In the nearby Orbiter Processing Facility, preparations of Discovery continue, and its payload bay doors have been closed in advance of the orbiter's move to the giant assembly building. The main payload for the mission, the U.S. Harmony Node 2 module for the International Space Station, will be loaded inside Discovery at the launch pad.

## POWERPACK

*Continued from Page 1*

In addition, run (or feed) duct piping extensions were added to the test stand. "The powerpack sits lower in the engine deck level than the SSME did," Nichols said, "so we had to extend the fuel and oxidizer lines to connect the test article to the facility."

Because there was no test article in place to check the facility's performance, a J-shaped duct was used to connect the liquid oxygen supply to the liquid oxygen pump discharge system. This duct work simulated the powerpack during the facility tests.

Technicians also recreated all the piping on the engine deck level to fit the J-2X configuration, and reconnected (and in some cases moved) the piping between the test stand and its flare stack. "There is no nozzle connected to the powerpack like there would be to a full engine, so the propellants are discharged through the facility and have to be burned off at the flare stack," Nichols said.

Simultaneous with the A-1 modifications, the J-2X Powerpack 1A was fitted with a gas generator, and liquid hydrogen and liquid oxygen pumps. The pumps, pulled from the Linear Aerospike Engine on display in SSC's visitor center, StennisSphere, received new seals, bearings and other internal refurbishments at PWR's Canoga Park, Calif., headquarters.

The pumps were modified versions of those used in the Apollo Program's J-2 engines, which helped propel Apollo's Saturn V rocket. The J-2 and the Linear Aerospike were also tested at SSC.

"Installation of the powerpack on the test stand is a real milestone," Benton said. "The facility's ready, the powerpack's ready – it's a good feeling knowing we're staying on track and meeting the schedule as part of SSC's efforts to help America return to the moon."

## Hancock County Chamber recognizes SSC

NASA Stennis Space Center was acknowledged as the economic engine of Hancock County and southwest Mississippi during the Hancock County Chamber of Commerce 2007 Annual Awards Gala on Aug. 29. Held on the second anniversary of Hurricane Katrina, the event theme was a 'salute to progress' following the storm's devastating impact along the Gulf Coast.

Rep. Gene Taylor (second from right) was named a Chamber Champion in recognition of his work to provide taxpayers with one seamless wind/water insurance protection. Pictured with Taylor are Partners for Stennis Board of Directors members (from left) Dave Treutel Jr., Tish H. Williams and Guy Johnson.

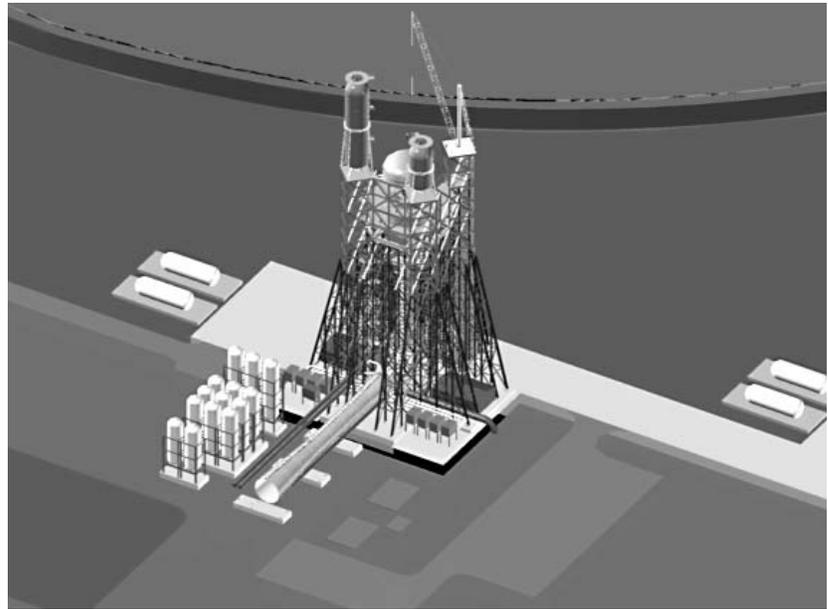


# SSC, MAF key to future exploration

Future NASA astronauts who land on the moon will owe their success to the men and women of the Gulf Coast, who are already at work on the next generation of space travel. NASA's Stennis Space Center and NASA's Michoud Assembly Facility in New Orleans both will have critical roles in the Constellation Program, which aims to land astronauts on the moon by the end of the next decade.

A sign of futuristic changes on the Gulf Coast, ground was broken Aug. 23 at SSC's new A-3 Test Stand where engineers will test the J-2X upper stage engine that will power the new fleet of rockets NASA is developing. The groundbreaking ceremony was attended by NASA Deputy Administrator Shana Dale, NASA Associate Administrator for Exploration Systems Scott "Doc" Horowitz, Stennis Center Director Richard Gilbrech, Mississippi Gov. Haley Barbour, Sen. Thad Cochran, Sen. Trent Lott and Rep. Gene Taylor.

"NASA has ambitious plans for astronauts to set up a lunar outpost in preparation for eventual journeys to Mars," said Gilbrech, who was recently named to lead



This engineer's concept shows how the new A-3 Test Stand under construction at Stennis Space Center will look upon completion in 2010. NASA has said the stand, which will conduct altitude testing on NASA's developing J-2X engine, is central to its plan for sending humans back to the moon.

the Exploration Systems Mission Directorate at NASA Headquarters in Washington, D.C. "We will not be able to accomplish these goals for the nation without the skilled workforce and unique capabilities of the Stennis and Michoud facilities."

See **CONSTELLATION**, Page 7

## NASA awards Ares I production contract

On Aug. 28, NASA selected the Huntsville, Ala.-based Boeing Co. as the contractor to provide manufacturing support for design and construction of the upper stage Ares I rocket that will launch astronauts to the International Space Station and eventually help return humans to the moon.

This November, Stennis Space Center will begin testing components of the Ares I's upper stage engines.

Boeing will provide support to a NASA-led design team during the design phase and will be responsible for production of the Ares I upper stage. Boeing will manufacture a ground test article, three flight test units and six production flight units

to support NASA's flight manifest through 2016. Final assembly of the upper stage will take place at NASA's Michoud Assembly Facility in New Orleans.

The contract type is cost-plus-award-fee and the period of performance is Sept. 1, 2007, through Dec. 31, 2016. The estimated contract value for design team support and the manufacture of the test units and six production flight units is \$514.7 million. The selection resulted from a full and open competition.

Ares I is an in-line, two-stage rocket that will carry to low Earth orbit the crew exploration vehicle Orion, which will succeed the space shuttle as NASA's primary vehicle for

human exploration in the next decade. The Ares I upper stage, with an engine and an avionics unit procured separately, will provide the navigation, guidance, control and propulsion required for the second stage of the rocket's ascent. The Ares I first stage will consist of a five-segment solid rocket booster and motor similar to those used on the space shuttle. The second, or upper, stage will consist of a J-2X main engine, a fuel tank for liquid oxygen and liquid hydrogen propellants and associated avionics.

The Ares I upper stage development is managed by NASA's Marshall Space Flight Center in Huntsville, Ala., for NASA's Constellation Program.

# Festival to feature many cultures

At Stennis Space Center's Diversity and International Festival on Oct. 3, there will be a little bit of everything for everybody from everywhere.

From an array of live entertainment to that nostalgic recipe, employees will have an opportunity to learn more about their work environment during the "We Are Similar ... We Are Different ... We Are Stennis" festival to be held from 10 a.m. to 2 p.m. in Building 1100.

A dancer, singer, poet or other talented employees will provide live entertainment. Booths will portray cultural aspects of specific countries; address the challenges of raising a special-needs child or of single parenting; talk about various religious cultures and more.



A free cookbook will be given to employees who attend the festival. The cookbook is a collection of employees' favorite ethnic recipes – perhaps handed down from "old country," Southern, New England, Cajun or Creole ancestral connoisseurs.

Committee members who helped organize the festival include Sheila Varnado for the talent segment. Bill Fisher collected recipes for the 2007 SSC Site-Wide cookbook, and Robin McCall coordinated the booths.

For more information about the festival, please contact Patricia Johnson at 688-2567 or by e-mail at [patricia.e.johnson@nasa.gov](mailto:patricia.e.johnson@nasa.gov) or JoAnn M. Larson at 688-2079 or by e-mail at [joann.m.larson@nasa.gov](mailto:joann.m.larson@nasa.gov).

## Diversity well-represented at Stennis

Stennis Space Center's workforce comprises an extremely diverse community.

Members of our community bring together unique, and sometimes misinterpreted, personalities that are representative of our backgrounds and experiences. Understanding, and taking into consideration, the differences that individuals bring to the workplace may prevent misunderstandings and conflicts when interacting with our peers.

An awareness of the personal/familial demands of a coworker often results in a greater sympathy for that individual regarding the challenges that he/she must overcome on a daily basis. In an effort to promote awareness about the culture of our unique community, a

joint Diversity and International Festival, "We Are Similar ... We Are Different ... We Are Stennis," will be held Oct. 3.

From the  
**Office of  
Diversity  
and Equal  
Opportunity**

The festival committee extended solicitations for interested individuals or groups to put together booths that represent various backgrounds of our community. A booth might portray the cultural aspects of a specific country; the challenges of raising a special-needs child; various religious cultures; single-parenting, etc.

Come join us and help celebrate the cultural aspects of your workplace.



## Information Technology Expo

More than 350 SSC employees attended the Third Annual IT Expo held July 26 in the Atrium of Stennis Space Center's Building 1100. Sponsored by the NASA SSC Office of the Chief Information Officer, the expo highlighted products and services available through NASA SSC OCIO and its contractor support agencies.

## CONSTELLATION

*Continued from Page 5*

Michoud recently marked the start of Constellation work at the facility. NASA is transforming Michoud operations to enable it to accommodate multiple programs – both space shuttle and Constellation – at the same time.

The large Michoud complex will be critical in manufacturing major pieces of the Orion crew capsule, the upper stage of the Ares I crew launch vehicle and the core stage of the Ares V cargo launch vehicle.

“Michoud has been supporting the U.S. space program since its earliest days, when parts of the enormous Saturn rockets were manufactured here,” said Sheila Cloud, acting chief operating officer and transition director for Michoud. “For those who weathered the aftermath of Hurricane Katrina here and still struggle with personal challenges related to the storm, it’s particularly heartening to know that our dedicated and tenacious workforce will enable exploration in the future.”

NASA’s Constellation Program is developing the Ares rockets and Orion crew capsule to return astronauts to the moon by 2020. On the lunar surface, astronauts will learn to live off the land to help prepare for future journeys out into the solar system.

Ares I will launch Orion, which will carry as many as six astronauts to the International Space Station or four to the moon. Ares V will be a heavy-lift cargo-launcher. The designs of the Ares and Orion spacecraft build on so-called heritage technologies, drawing on elements of Apollo and the space shuttle, and updating them with contemporary materials, manufacturing techniques and safety features. The agency is drawing from existing workforce, processes, infrastructure, facilities and equipment as much as possible to ensure Constellation’s success.

“The testing heritage of Stennis was a key contributor in the agency’s decision to build the new A-3 stand for J-2X testing,” said Gilbrech. “As in the Apollo and Space Shuttle programs, large elements of the Ares and Orion will be manufactured and assembled at Michoud, a facility tailored for space hardware of this scale.”

With the first Constellation test flight less than two years away, activity on the Gulf Coast is increasing quickly. Ares I and Orion are expected to be operational, launching with crews of astronauts, by 2015.

## AROUND NASA

■ **Water vapor seen ‘raining down’ on young star system:** NASA’s Spitzer Space Telescope has detected enough water vapor to fill the oceans on Earth five times inside the collapsing nest of a forming star system. Astronomers say the water vapor is pouring down from the system’s natal cloud and smacking into a dusty disk where planets are thought to form. The observations provide the first direct look at how water begins to make its way into planets. The star system, called NGC 1333-IRAS 4B, is still growing inside a cool cocoon of gas and dust. The new Spitzer data indicate that ice from the stellar embryo’s outer cocoon is falling toward the forming star and vaporizing as it hits the disk. Spitzer picked up the first clear signature of water vapor on a hot, gas planet outside our solar system, named HD 189733b.

■ **Up, up and away — to Venus:** Scientists hope to learn more about climate changes here on Earth by studying Venus. A prototype balloon could eventually study the planet’s surface and examine its atmosphere and the bizarre winds and chemistry within it. A team of JPL, ILC Dover and NASA Wallops Flight Facility engineers designed, fabricated and tested the balloon. By flying in the cool skies above Venus, the balloons would avoid that environment. The spherical balloon, 18 feet in diameter, is about the size of an inflatable children’s jumper.

■ **Mars Reconnaissance Orbiter status report:** Diagnostic tests and months of stable, successful operation have resolved concerns about long-term prospects for the powerful telescopic camera on NASA’s Mars Reconnaissance Orbiter. The High Resolution Imaging Science Experiment camera on the orbiter has now taken more than 3,000 images of Mars, resolving features as small as a desk in targeted areas covering thousands of square miles of the Martian surface. Already, this is the largest Mars data set ever acquired by a single experiment. The camera is one of six instruments on the orbiter. Tests have yielded an explanation for the earlier pattern, and the camera’s performance record shows the noise stopped getting worse after about three to four months of the science phase.

## Hail & Farewell

### NASA welcomes the following to SSC:

<b>Patrick Scheuermann</b>	associate director Office of the Director
<b>Rebecca McKenzie</b>	contract specialist Business Management Directorate
<b>Susie Cour-Palais</b>	management & program analyst Center Operations Directorate

### And bids farewell to the following:

<b>Penny Parker</b>	lead contract specialist Business Management Directorate
<b>Suzanne French</b>	legal intern Office of the Chief Counsel

## DEVELOP students



University of New Orleans students Angie Pelkie (left) and Lauren Childs and University of Southern Mississippi student Jason Jones (right) continue DEVELOP's goal of extending NASA's Earth science research to communities in their region. They use NASA satellite data to find better ways to measure forest disturbances after hurricanes and to predict fire hazards and invasive species threats in regional timberlands. With the help of Geographer Roxanna Moore of Science Systems & Applications Inc. (second from right) and advisers Kenton Ross and Joe Spruce (not shown), the team is comparing satellite imagery before and after Hurricane Katrina to build a model for more accurate fire hazard predictions.

## New StenniSphere exhibit

A new exhibit depicting NASA's role in hurricane prediction and research, and SSC's role in helping the region recover from Hurricane Katrina is now on display at StenniSphere.



StenniSphere's hurricane exhibit

The cyclone-shaped exhibit focuses on the 2005 storm's effects and outlines how NASA works to improve weather forecasting. With photos, 3-D models and digital animations, it illustrates how satellite instruments measured the storm's internal mechanics, such as rain and temperature. It also tells how NASA satellites and research can increase accuracy in hurricane tracking and modeling.

## Astro Camp Saturday

Astro Camp Fall Saturday registration is now open for children ages 7-12. Themes are "What's Up in the Night Sky" and "First Flight to Space Flight."

Campers will investigate the major elements of the night sky in "What's in the Night Sky" on Oct. 6 and 20. Activities will include building models of the planets, solar system and satellites. On Nov. 3 and Nov. 17, campers will study the history of flight during "First Flight to Space Flight." Activities include making several kinds of kites and learning about hot air balloons and the propulsion principles that send the space shuttle into orbit. Cost to attend is \$25 per student, lunch is not included. For more details, go to <http://education.ssc.nasa.gov/AstroCampSchedule.asp> or call 1-800-237-1821, option 4.

## LEGO League kickoff

More than 100 students, parents and teachers attended FIRST LEGO League competition kickoff event held at StenniSphere on Sept. 15.

During the next three months, students ages 9-14 will participate in FLL's 2007 Challenge, "Power Puzzle." FLL is a unique program that combines the rigor of science and engineering with the excitement of a sports event. The teams will learn to program and complete robotics missions using the LEGO Mindstorms NXT kit. In addition, they will do a research project on alternative fuels and power conservation. The season ends Dec. 8 at Mississippi Gulf Coast Community College, where teams will compete in the Mississippi Championship Tournament. NASA provides volunteers, referees and judges for this event. To help, please call Randall Hicks at 228-688-3653 or Katie Wallace at 228-688-7744.

## LAGNIAPPE

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